

CLAIMS

We claim:

1. A water-based drilling fluid comprising: a) a polymer latex capable of providing a deformable latex film on at least a portion of a subterranean formation; and b) water.

2. The water-based drilling fluid of claim 1 where the water comprises salt.

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3. The water-based drilling fluid of claim 1 further comprising a precipitating agent.

4. The water-based drilling fluid of claim 1 further comprising a surfactant.

10 5. A water-based drilling fluid comprising: a) a polymer latex; b) a precipitating agent; and c) water.

6. The water-based drilling fluid of claim 5 where the water comprises salt and is a saturated salt brine.

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7. The water-based drilling fluid of claim 5 further comprising a surfactant.

8. A water-based drilling fluid comprising: a) a polymer latex; b) a precipitating agent; c) a surfactant; and d) water.

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9. The water-based drilling fluid of claim 8 where the water comprises salt.

10. The water-based drilling fluid of claim 9 where the salt in the saturated salt brine is selected from the group consisting of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, calcium bromide, sodium bromide, potassium bromide, calcium nitrate, sodium formate, potassium formate, cesium formate, and mixtures thereof.

11. The water-based drilling fluid of claim 8 where the polymer latex is capable of providing a deformable latex seal on at least a portion of a subterranean formation and is selected from the group consisting of polymethyl methacrylate, polyethylene, carboxylated styrene/butadiene copolymer, polyvinylacetate copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene, polydimethylsiloxane, and mixtures thereof.

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12. The water-based drilling fluid of claim 8 where the precipitating agent is selected from the group consisting of silicates, aluminum complexes, and mixtures thereof.

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13. The water-based drilling fluid of claim 8 where the surfactant is selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines, ether carboxylates, and mixtures thereof.

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14. The water-based drilling fluid of claim 8 where the polymer latex is present in the drilling fluid in an amount of from about 0.1 to about 10 volume % based on the total water-based drilling fluid.

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15. The water-based drilling fluid of claim 8 where the precipitating agent is present in the drilling fluid in an amount of from about 0.25 to about 20 lb/bbl based on the total water-based drilling fluid.

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16. The water-based drilling fluid of claim, 8 where the surfactant is present in the drilling fluid in an amount of from about 0. 005 to about 2 wt. % based on the total water-based drilling fluid.

17. The water-based drilling fluid of claim 9 where the salt is present in the drilling fluid in an amount of from about 1 wt. % to about saturation based on the total water-based drilling fluid.

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18. The water-based drilling fluid of claim 8 where polymer latex comprises particles that average less than 1 micron in size.

19. A water-based drilling fluid comprising: a) from about 1 to about 10 volume % of a polymer latex selected from the group consisting of polymethyl methacrylate, polyethylene, carboxylated styrene/butadiene copolymer, sulfonated styrene/butadiene copolymer, polyvinylacetate copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene, polydimethylsiloxane, and mixtures thereof; b) from about 0.25 to about 20 lb/bbl of a precipitating agent selected from the group consisting of silicates, aluminum complexes, and mixtures thereof; c) at least 1 wt. % of a salt selected from the group consisting of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, calcium bromide, sodium bromide, potassium bromide, calcium nitrate, sodium formate, potassium formate, cesium formate, and mixtures thereof; d) from about 0.005 to about 2 vol. % of a surfactant selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines, ether carboxylates, and mixtures thereof; and e) water making up the balance, where the proportions are based on the total water-based drilling fluid.

20. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation, the method comprising: a) providing a water-based drilling fluid comprising: i) a polymer latex capable of providing a deformable latex seal on at least a portion of a subterranean formation; and ii) water; and b) circulating the water-based drilling fluid in contact with a borehole wall.

21. The method of claim 20 where in providing the water-based drilling fluid, the water comprises salt.

22. The method of claim 20 where in providing the water-based drilling fluid, the fluid further comprises a precipitating agent.

23. The method of claim 20 where in providing the water-based drilling fluid, the fluid further comprises a surfactant.

24. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation, the method comprising: a) providing a water-based drilling fluid comprising: i) a polymer latex; ii) a precipitating agent; and iii) water; and b) circulating the water-based drilling fluid in contact with a borehole wall.

25. The method of claim 24 where in providing the water-based drilling fluid, the water comprises salt and is a saturated salt brine.

26. The method of claim 24 where in providing the water-based drilling fluid, the water-based drilling fluid further comprises a surfactant.

27. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation, the method comprising: a) providing a water-based drilling fluid comprising: i) a polymer latex; ii) a precipitating agent; iii) a surfactant; and iv) water; and b) circulating the water-based drilling fluid in contact with a borehole wall.

28. The method of claim 27 where in providing the water-based drilling fluid, the water comprises salt.

29. The method of claim 28, where the salt is selected from the group consisting of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, calcium bromide, sodium bromide, potassium bromide, calcium nitrate, sodium formate, potassium formate, cesium formate, and mixtures thereof.

30. The method of claim 27, where in providing the water-based drilling fluid, the polymer latex is capable of providing a deformable latex seal on at least a portion of a subterranean formation and is selected from the group consisting of polymethyl methacrylate, polyethylene, carboxylated styrene/butadiene copolymer, polyvinylacetate

copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene, polydimethylsiloxane, and mixtures thereof.

31. The method of claim 27 where in providing the water-based drilling fluid, the
5 precipitating agent is selected from the group consisting of silicates, aluminum complexes,
and mixtures thereof.

32. The method of claim 27 where in providing the water-based drilling fluid, the surfactant
is selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines,
10 ether carboxylates, and mixtures thereof.

33. The method of claim 27 where in providing the water-based drilling fluid, the polymer
latex is present in the drilling fluid in an amount of from about 0.1 to about 10 vol. % based
on the total water- based drilling fluid.

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34. The method of claim 27 where in providing the water-based drilling fluid, the precipitating agent is present in the drilling fluid in an amount of from about 0.25 to about
20 lb/bbl based on the total water-based drilling fluid.

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35. The method of claim 27 where in providing the water-based drilling fluid, the surfactant
is present in the drilling fluid in an amount of from about 0.005 to about 2 vol. % based on
the total water- based drilling fluid.

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36. The method of claim 28 where the salt is present in the drilling fluid in an amount of
from about 1 wt. % to about saturation based on the total water-based drilling fluid.

37. The method of claim 27 where in providing the water-based drilling fluid, the polymer
latex comprises particles that average less than 1 micron in size.

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38. A method of inhibiting borehole wall invasion when drilling with a water-based drilling
fluid in a subterranean formation, the method comprising: a) providing a water-based

drilling fluid comprising: i) from about 0.1 to about 10 vol. % of a polymer latex selected from the group consisting of polymethyl methacrylate, polyethylene, carboxylated styrene/butadiene copolymer, sulfonated styrene/butadiene copolymer, polyvinylacetate copolymer, polyvinyl acetate/vinyl chloride/ethylene copolymer, polyvinyl acetate/ethylene copolymer, natural latex, polyisoprene, polydimethylsiloxane, and mixtures thereof; ii) from about 0.25 to about 20 lb/bbl of a precipitating agent selected from the group consisting of silicates, aluminum complexes, ether carboxylates, and mixtures thereof; iii) at least 1 wt. % of a salt selected from the group consisting of calcium chloride, sodium chloride, potassium chloride, magnesium chloride, calcium bromide, sodium bromide, potassium bromide, calcium nitrate, sodium formate, potassium formate, cesium formate, and mixtures thereof; iv) from about 0.005 to about 2 vol. % of a surfactant selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines, ether carboxylates, and mixtures thereof; and v) water making up the balance, where the proportions are based on the total water-based drilling fluid; and b) circulating the water-based drilling fluid
15 in contact with a borehole wall.

39. A water-based drilling fluid comprising: a) from about 1 to about 10 volume % of a sulfonated styrene/butadiene copolymer latex; b) from about 0.25 to about 20 lb/bbl of a precipitating agent selected from the group consisting of silicates, aluminum complexes,
20 and mixtures thereof; and c) water making up the balance, where the proportions are based on the total water-based drilling fluid.

40. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation, the method comprising: a) providing a water-based
25 drilling fluid comprising: i) from about 0.1 to about 10 vol. % of a sulfonated styrene/butadiene copolymer; ii) from about 0.25 to about 20 lb/bbl of a precipitating agent selected from the group consisting of silicates, aluminum complexes, ether carboxylates, and mixtures thereof; and iii) water making up the balance, where the proportions are based on the total water-based drilling fluid; and b) circulating the water-based drilling fluid
30 in contact with a borehole wall.

41. The method of Claim 40 wherein the drilling fluid is being used to stabilize shale or reduce drilling fluid loss while drilling in depleted sands.

42. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation to reduce drilling fluid loss while drilling in depleted sands, the method comprising: a) providing a water-based drilling fluid comprising: i) from about 0.1 to about 10 vol. % of a sulfonated styrene/butadiene copolymer; and ii) water making up the balance, where the proportions are based on the total water-based drilling fluid; and b) circulating the water-based drilling fluid in contact with a borehole wall.

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43. A method of inhibiting borehole wall invasion when drilling with a water-based drilling fluid in a subterranean formation to reduce drilling fluid loss while drilling in depleted sands, the method comprising: a) providing a water-based drilling fluid comprising: i) from about 0.1 to about 10 vol. % of a carboxylated styrene/butadiene copolymer; ii) from about 15 0.005 to about 2 vol. % of a surfactant selected from the group consisting of betaines, alkali metal alkylene acetates, sultaines, ether carboxylates, and mixtures thereof; and water making up the balance, where the proportions are based on the total water-based drilling fluid; and b) circulating the water-based drilling fluid in contact with a borehole wall.